REMARKS

Claims 1-13, 16-31, 33-36, 38-42, and 51-53 are currently pending. Claims 14, 15, 32, 37, and 43-50 are canceled. Claim 53 is newly added.

1. Claims 1-13, 18, 21, 23-31, 34, 36, and 39-42 were rejected under 35 U.S.C 103(a) as being unpatentable over Duvall et al. (US 6,391,442, herein referred to as "Duvall") in view of Shikata et al. (US 6,255,376, herein referred to as "Shikata"). Applicants respectfully traverse this rejection.

Claim 1 recites a thermal interface material including a polymer component, a phase change component, and greater than about 7% by weight of a non-ionic surfactant. Claim 25 is directed to a thermal interface material including a phase change wax and greater than about 7% by weight of a non-ionic surfactant. Claim 36 recites a thermal interface tape having a first layer including a conductive film and having a second layer including the thermal interface material recited in claim 25.

Claim 42 is directed to a microelectronic structure including an integrated circuit active device, a heat sink, and a thermal interface tape disposed between the device and the heat sink. The thermal interface tape includes a phase change component and greater than about 7% by weight of a non-ionic surfactant.

The PTO appears to rely on Duvall as teaching a thermal interface material disposed between a heat sink and a heat source. Duvall discloses a thermal interface material that includes thermally conductive filler particles in a phase change material. The phase change material includes a polymer component and a melting point component, which adjusts the softening temperature of the phase change material. Duvall discloses a wetting agent, KR38, which is used in amounts of 0.24% and 0.26% by weight in Examples 18 and 19, respectively. The PTO considers wetting agent to meet the claimed surfactant feature of the present claims.

However, as defined in the present specification, a wetting agent is not a surfactant. A surfactant is a substance that lowers the surface or interfacial tension of the medium in which it is dissolved, and specifically is contrasted against and does not include wetting agents, such as KR38 (See Paragraph 0028). The PTO has also turned to Shikata in an attempt to meet the deficiencies of Duvall.

Shikata discloses a thermally conductive compound including 0.5 to 5wt% of a dispersing agent, such as a glycerin fatty acid ester. Shikata teaches that the amount of dispersing agent is necessarily in a range of 0.5-5.0 wt%, unequivocally stating that greater than 5wt% decreases the adhesion. (Shikata, col. 9, lines 1-21). At best, the references suggest less than 5wt% of the glycerin fatty acid ester of Shikata. The references fail to teach or remotely suggest a thermal interface material including greater than about 7% by weight of a non-ionic surfactant.

Further, with respect to the claimed minimum content of surfactant, Applicants have discovered that the *combination* of greater than about 7% by weight non-ionic surfactant with a phase change component in the context of thermal interface materials provides unexpected results. Specifically, Applicants discovered that the combination of the claimed minimum non-ionic surfactant content and phase change components provides both improved peel strength and reduced thermal impedance. In particular, Applicants have discovered that the combination leads to significant increases in peel strength, as illustrated in Examples 1-5, which is advantageous for thermal interface tape embodiments. In contrast, Shikata teaches precisely the opposite, that use of greater than 5% dispersing agent reduces peel strength. The improvements in peel strength and thermal impedance would not have been expected by one of ordinary skill and are indicative of the non-obviousness of the claimed invention.

For at least the foregoing reasons, Applicants respectfully submit that claims 1-13, 18, 21, 23-31, 34, 36, and 39-42 are patentable over Duvall in view of Shikata. Accordingly, reconsideration and withdrawal of the 35 U.S.C. §103 rejection are respectfully requested.

2. Claims 1, 2, 6, 7, 10-13, 16-17, 21-23, 25, 27, 28, 30, 31, 33, 36, 38, 40, 41, and 42 were rejected under 35 U.S.C 103(a) as being unpatentable over Bunyan et al (US 6,054,198, herein referred to as "Bunyan). Applicants respectfully traverse this rejection.

Bunyan discloses a thermally-conductive interface formed as a self-supporting layer of a thermally conductive material, which has a transition temperature between two phases. Bunyan teaches that conventional wetting, opacifying, or anti-foaming agents, pigments, flame retardants, and antioxidants also may be added to the formulation depending upon the requirements of the particular application envisioned. Bunyan does not disclose specific wetting agents and does not disclose use of specific quantities of such wettings agents.

Foremost, Bunyan's disclosure is limited to conventional wetting agents, and nowhere discloses or suggests surfactants as claimed. In addition, Bunyan is silent with respect to the claimed surfactant content, a particularly notable feature of the claimed invention as explained in detail above.

For at least the foregoing reasons, Applicants respectfully submit that claims 1, 2, 6, 7, 10-13, 16-17, 21-23, 25, 27, 28, 30, 31, 33, 36, 38, 40, 41, and 42 are patentable over Bunyan. Accordingly, reconsideration and withdrawal of the 35 U.S.C. §103 rejection are respectfully requested.

3. Claims 1, 2, 6, 7, 10-13, 18, 21-23, 25, 27, 28, 30-32, 34, 36, and 39-42 were rejected under 35 U.S.C 103(a) as being unpatentable over Bunyan in view of Shikata. Applicants respectfully traverse this rejection.

As previously noted, Bunyan fails to teach or suggest a surfactant and, in particular, fails to teach or suggest an amount of surfactant. Accordingly, the PTO has turned to Shikata. However, the PTO's reliance on Shikata is deficient for the reasons noted above with respect to the rejection over Duvall and Shikata.

For at least the foregoing reasons, Applicants respectfully submit that claims 1, 2, 6, 7, 10-13, 18, 21-23, 25, 27, 28, 30-32, 34, 36, and 39-42 are patentable over Bunyan in view of Shikata. Accordingly, reconsideration and withdrawal of the 35 U.S.C. §103 rejection are respectfully requested.

4. Claims 19, 20, 35, and 50-52 were rejected under 35 U.S.C 103(a) as being unpatentable over Duvall and as being unpatentable over Bunyan. Applicants respectfully traverse these rejection.

Both Duvall and Bunyan fail to teach or suggest the surfactant of the presently claimed invention. Further, Duvall and Bunyan fail to teach or suggest an amount greater than about 7% of the surfactant as claimed. While the PTO has argued that the amount of surfactant would have been chosen to achieve the desired surface active properties of the composition, the art as a whole specifically teaches against compositions containing greater than 5% by weight. In contrast, Applicants have discovered that amounts greater than 7% by weight of the surfactant in the context of a thermal interface material containing a polymer and a phase change component achieves unexpectedly superior performance.

For at least the foregoing reasons, Applicants respectfully submit that claims 19, 20, 35, and 50-52 are patentable over Bunyan in view of Shikata. Accordingly, reconsideration and withdrawal of the 35 U.S.C. §103 rejection are respectfully requested.

Applicants respectfully submit that the present application is now in condition for allowance. Accordingly, the Examiner is requested to issue a Notice of Allowance for all pending claims. Should the Examiner deem that any further action by the Applicants would be desirable for placing this application in even better condition for issue, the Examiner is requested to contact Applicants' undersigned attorney at the number listed below.

Applicants do not believe that any additional fees are due, but if the Commissioner believes additional fees are due, the Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 50-2469.

Respectfully submitted,

12-21-05
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